neighbouring areas. These canoes are varied, beautiful and some are spectacular. This study reveals that they are also sophisticated and evolved vessels. The technical descriptions are well illustrated with drawings and sketches.

The villages where the various designs of canoe can be found are listed and directions for reaching them given. The parts of the canoes are individually described and named, their design and construction is elaborated and details of various ceremonies are given.

The book is arranged in three parts. The first deals with Bali, the second deals with Madura and East Java, and the third part discusses the evolution of Pacific canoe rigs. This latter part is only indirectly connected with the main subject of the book and covers a somewhat contentious area.

In justifying the inclusion of a theory about the development Pacific canoe rigs, Horridge asserts that "the Low Balinese and Madurese languages are more akin to Polynesian than they are to any of the languages of Asia" (p. xi). This is a simplification which contrasts Balinese and Madurese with the mainland Indo-Chinese languages but discounts the many Austronesian languages of South East Asia.

Before setting out his theory on Pacific rigs Horridge describes and names the many rigs that can be found throughout Austronesian maritime technology and in this he improves on previous definitions because he takes note not only of sail shapes but of different setting and handling techniques that make sails functionally dissimilar. In this respect he gets away from the diffusionist desire to see all sails as essentially the same.

There is a brief discussion of previous theories about the development and distribution of Pacific rigs. These are theories about migration and the populating of the Pacific using canoe technology and terminology as evidence. Horridge points out some of the problems with these theories particularly Doran's recent ideas (Doran 1981).

Finally he puts forward his own ideas but these are no more based on evidence than Doran's ideas are in Horridge's assessment. The Horridge theory is imaginative but unprovable because it is based on pure speculation. We are invited: "Let us imagine what kind of a rig a sensible raft captain living in, say, Sulawesi 30,000 years ago would have had" (p.154). Of course we will never know.

Anyway it doesn't matter because "Outrigger Canoes of Bali and Madura" is an excellent tribute to these beautiful sailing craft and their builders.

Doran, E. 1981. *Wangka: Austronesian canoe origins.* Texas A & M University Press: Texas.

NICK BURNINGHAM
Northern Territory Museum of Arts
and Sciences,
GPO Box 4646,
Darwin, NT 0801, Australia.

Allozyme electrophoresis: A handbook for animal systematics and population studies

by B.J. Richardson, P.R. Baverstock and M. Adams

Academic Press: Sydney, Florida, London 1986 ISBN 0 125 87840 0
Pp. 401; R.R.P.: $60.00 (hard cover)

This excellent volume has been produced by three of Australia's leading biochemical geneticists. Perhaps an illustration of their combined experience is best shown by the diversity of organisms which they have studied in the past. These include dolphins, ungulates, marsupials (both dasyurid and macropodid), rodents, rabbits, bats, birds,

reptiles (turtles, snakes and lizards), amphibians, fish, prawns, ticks, molluscs, and protozoan parasites. Many of these studies have been intensive population analyses or have involved the majority of taxa (in an Australian context) in many of these broader groups. The Systematics and Evolutionary Biology Unit at the South Australian Museum (run by P.R.B. and M.A.) can routinely analyse specimens for up to 70 enzyme systems, in what must be one of the world's most cost-effective biochemical laboratories.

So much for the authors, what about their book? This conveniently sized hardback volume has been organized into four parts and thirteen chapters. The parts are titled:

1. Project planning,
2. Collecting the data,
3. Analysing the data,
4. Other types of projects.

These titles represent to me what is the only real weakness in the volume, for they don't accurately reflect what they contain. This is a trifling criticism, but they appear to be unnecessary and to have been added, perhaps by the publishers, to fulfill the expectations of a handbook. Let us look at each of these four parts in turn and consider their worth.

The first section, "Project planning" (82 pages), belies its title as it is in fact more a genetic overview of the techniques to be used; i.e. population genetics theory and the methodology of statistical analysis from a population and systematics approach. Its six chapters cover: genetics, electrophoresis, population structures, systematics, statistical methods and finally, project planning and sampling strategies. The section title is relevant to the last chapter alone.

These chapters in particular reflect the level at which the book is aimed. They are well written, easy to read and clearly designed for post-graduate students and working scientists who wish to adopt an electrophoretic approach to their research, with a minimum of past experience.

The second section "Collecting the data" (187 pages) comes right to the point. This takes us through a most detailed yet readily understood breakdown of electrophoretic techniques. The chapters include: sample collection and handling preparation; electrophoretic methods; specific enzyme methods for cellulose acetate electrophoresis; and strategies.

Each of these chapters is filled with helpful tips and the minutae of electrophoretic technique gained from years of experience. Once again, the format ensures that the reader understands exactly what is going on, and the 15 plates in chapter 8 allow no misconceptions as to the equipment to be used. The reader is provided with the optimal experimental approach and the most cost-effective means of achieving it.

In the chapter on enzyme methodology the format of the volume changes to a series of "sheets", each of which deals with a separate enzyme system, the electrophoretic conditions, required staining and background information about the technique. This ensures that the reader can follow through a technique without an inadvertant mixup, although it necessarily breaks the continuity of the book. In the following chapter we return to the previous format and deal with the best and most economical methods which can be utilized.

If we consider the book as a whole at this point, we are struck by the developmental intricacies of what we consider to be a modern biochemical technique. For the basis of this volume is in fact not electrophoresis in general, but only one limited aspect of it. That is, the use of the cellulose acetate technique, and in particular, a gel form of this marketed under the brand name of "Cellogel". Undoubtedly, the authors regard this relatively expensive but most versatile media as the best thing since sliced bread. Indeed, by imposing this limitation on the volume, and not considering other media such as agarose, acrylamide and starch, they have been able to present a well defined methodology and itemise its known peculiarities. Such a unified approach could not be presented within the bounds of a laboratory handbook, if the diverse conditions for each of the base media were provided, most of which are different and not interchangeable. Nevertheless, while this limitation ensures repeatability, as the authors point out, much can be said for those biochemical laboratories which have the capacity to use a variety of support media.

In the third section of the book we turn to the means of "Analysing the data" (76 pages). This is comprised of two chapters:

population analysis using electrophoretic data; and analysis of electrophoretic data in systematics. There is little doubt that this section provides a highly readable account of the means by which we can answer the questions we have previously asked. Particular case studies are presented of population analyses which may exemplify a weakness or excellence of application. We also analyse the mechanisms of phylogenetic reconstruction, methods for calculating distances in varying conditions and the application of Hennigian phylogenetics.

The last section which contains a single chapter of 14 pages, simply shows us "Other biological uses for allozyme electrophoresis". This gives us an itemized account of how we can use electrophoresis in areas as diverse as meat substitution to that of parental testing. This section could well have been included as an appendix to the volume. It does give the impression of being "tacked on" at the end. In this respect, Appendix 2 may also have been given a different treatment. I find it difficult to understand why these most informative plates, which showed some beautiful examples of genetic phenomena and technical abnormalities, were simply lumped together at the end of the book as an appendix rather than being integrated into the text. To me these plates seem to have been wasted.

In summary, this volume has achieved what it set out to do. It has provided a handbook for those intending to use electrophoresis (albeit "Cellogel"), as a tool for answering practical questions on population structure analysis, systematics or specimen identification. Yet it does more than this. It integrates electrophoresis into evolutionary and systematic theory in a clearcut and straightforward manner. It is well bound, and well presented with excellent line drawings and informative photographs. To me, this volume is a must for any zoologist who wishes to use, or at least understand, the value of allozyme electrophoresis as an investigative technique.

MAX KING
Northern Territory Museum of Arts and Sciences,
GPO BOX 4646,
Darwin, NT 0801, Australia.